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ABSTRACT

Factor analysis accounts for most of the variance in adult ratings of concepts with adjectives. Affective reactions are present in young infants, but still to be explored is how the stable adult factor structure develops from these reactions. Three questions are investigated in this study: (1) is this factor structure present in 3- and 4-year-olds; (2) does it occur initially verbally or non-verbally; and (3) is it an age-related or a stage-related development? Nineteen subjects ranging in age from 3:0 to 5:1 years, with a mean age of 4:0, were given the task of rating concepts both verbally and non-verbally. With adults, factor analysis reliably divides scales into three factor groups: evaluation, potency, and activity. Factor analysis of the present data, however, found no structure at all, rather great variability among children in their use both of words and pictographs. Though each child must learn the adult factor structure for himself, the similarity between children's strategies for word concatenation increases with age. Appropriate use of graphic scales appears sooner than that of verbal scales, providing evidence that language is perhaps not a system separate from other cognitive systems. (CLK)

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Patterns of Verbal and Nonverbal Qualification in Very Young Children[1]

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When adults use a large number of adjectives to rate a similarly large number of concepts (words, sounds, pictures, etc.), factor analysis will account for most of the variance in this multitude of judgments with only three factors. Evaluation (E) accounts for the largest proportion of the variance (37%), Potency (P) the next largest (16%), and finally Activity (A) (11%) accounting for the least (Osgood, Suci, and Tannenbaum, 1957). A similar structure of connotative meaning has been demonstrated cross-culturally (Osgood, 1971a, Osgood, May, and Miron, 1975).

A recurring question in the psychological literature has been how this structure develops. While a number of researchers have addressed this problem (Donahoe, 1961; Lilly, 1965; DiVesta, 1966; Small, 1967; Naylor, 1971), all that was finally demonstrated is that no observable development occurs after the second grade (DiVesta, 1966).

While both Osgood (in Osgood et al. 1957 and elsewhere) and DiVesta (1970) suggest that affective reactions are present in very young infants, the question remains of how the stable adult factor structure develops from these reactions. The purpose of this research, then, is to determine whether this structure is present in three and four-year-olds, whether it occurs initially verbally or nonverbally, and whether it is an age-related or stage-related development.

Method

Subjects: Twenty-seven children from the University of Illinois Children's Research Center nursery and pre-school participated with their parents' consent. Eight of these children lost interest before testing was completed, so their data was discarded. The remaining nineteen subjects range in age from 3.0 to 5.1, with a mean age of 4.0.

Scales: For the verbal marker scales, the adjectives from the standard short-form semantic differential were pre-tested with children from this age range.

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The two most familiar scales for each factor were chosen for this study (E scales: good-bad, sweet-sour; P scales: big-little, strong-weak; A scales: fast-slow, noisy-quiet.)

The five graphic scales for each factor were taken from French (1974). Each pair of pictographs appeared side by side on a separate, plastic-covered page of a loose-leaf notebook. For both verbal and non-verbal scales, the left-right orientation of scale numbers was randomized so that the positive loading scale term was just as often on the right as the left side. Similarly, the scales themselves were randomized so that E, P, and A scales did not fall together.

Concepts: Two concepts from each octant of semantic space were chosen (2 x 8 = 16). Since there is much less agreement among children as to the connotation of particular words, it was necessary to insure that there was at least one concept of each polarity for E, P, and A. To provide such concepts, each subject was asked to rate "the nicest thing you can think of," "the worst thing you can think of," and so on for the strongest, weakest, fastest and slowest.[2]

Procedure: Children were tested individually in a small, quiet room. Sessions were less than fifteen minutes long, consistent with the short attention spans of this age range. In the first session, the child was introduced to the pictorial scales. For each scale, the child was asked, "Can you tell me what those are?" In most cases, the pictographs were readily identified. If no response was given, the first prompt was "Are they both just alike?", which usually brought a negative response. The next prompt was "Tell me how they're different" which usually elicited a correct description. In this manner, it was ascertained that the child correctly perceived each member of each scale.

In the second session, and all following sessions, subjects rated the concepts. For each concept and each scale, the subject was instructed to "Point to the one that is most like the concept," or "Point to the one that you feel the same way about," etc., until the subject felt he understood the task, and was willing to proceed. Rather than the seven-step scale used with adults, a three-step scale was used. In order to avoid inadvertently reinforcing particular responses but to still encourage the child to continue,

all judgments were praised with "that's good," "that's fine," etc. Verbal scales were administered orally, e.g., "Is the SUN strong or weak?" Every fifth to tenth scale, the subject was asked in a pleasant voice, "Why did you pick that one?" to elicit an explanation for his choice. In this manner, response styles were discouraged, since the subject could expect to have to explain his choice. As with judgments, all explanations were praised.

At the conclusion of each testing session, each child received a small reward for his participation. Approximately eight sessions were required for each child.

Results

In research of this kind with adults, Factor Analysis reliably divides the scales into E, P, and A groups (Osgood, Suci, and Tannenbaum, 1957.) Factor Analysis of the present data find no structure at all.

Whereas scales indexing Evaluation, for example, are all highly correlated with one another for adults, this is only sometimes the case for children. Further, correlations between scales indexing different factors were the rule for children and the exception for adults.

In view of the well-documented variability between children as to the connotative meaning of concepts (e.g., Maltz (1963) -- and presumably between scales also -- the data from each subject were analyzed separately. Selected data from these nineteen individual multiple correlation matrices appear in Table 1.

From these data, it is obvious that there is a tremendous variability among children in their use of both words and pictographs. Most children display little if any tendency for Potency scales to be highly correlated, for example, while one or two exhibit extremely high correlations, approaching those of adults. While there is a tendency for older children to use scales which have high correlations for adults more similarly, this variation is not age-dependent. That this increase in correlation is not strictly associated with age is characteristic of learned, rather than maturational phenomena.

Correlations between at least two nonverbal scales were higher than between verbal scales for most subjects. This was true for 68% of subjects for E scales, 95% for P scales, and 89% for A. Thus, in the majority of cases, appropriate nonverbal scales were used more similarly than were the most common adjectives.

Discussion

At the stage in the development of affective meaning represented by these subjects, affective meaning appears relatively unstructured; this may well be due to inability to use either adjectives or pictographic scale terms as opposites. For verbal scales, this would be at least partly explained by the simple fact that many children have acquired the meaning of only one of the adjectives or have not yet distinguished between them (Clark, 1971, Wales and Campbell, 1970.) Other research indicates that the connotative meanings of these oppositional scale terms are similar rather than opposed at early ages (Harasym, Boersma, and Maguire, 1971.) Those children who could not use the adjectives at all appropriately were also unable to use the pictographs in most cases.

The first conclusion which can be drawn from this study is that the high correlations between the use of E, P, and A adjectives found universally in adults (Osgood, 1971a, Osgood, May, and Miron, 1975) was not found in these young children. Similarly, the pattern of adult usage of certain pictographic scales (French, 1974) is also not observed in most of these subjects. However, this is not evidence that the affective reactions responsible for the correlations are not present. Affect and the affective meaning of words and pictures are not the same thing. A neonate who did not respond differentially to pin prick and a warm bottle would not be considered normal. While human eyes can perceive relative size and human ears can distinguish loud from soft, that large things generally make louder noises than small things is a learned synesthetic relation. Thus, as younger and younger children are tested in the search for the origins of the adult affective structure, it is expected that a stage of development which is different from that of the adult would eventually be found.

The variability among the children in their correlations (see Table 1) is additional evidence that each child must learn the adult factor structure for himself. Just as children vary in their first syntactic strategies (Bloom, 1970; Bowerman, 1973,) they surely vary also in the specific associations made relating aspects of their environment in the early stages. However, despite initial variation in their earliest grammars -- because children learning a particular language are exposed to the same model -- similarity between children's strategies for word concatenation increases with age. The

complex network of semantic relations underlying semantic differential judgments in adults is acquired only through perceptual and later verbal experience. (See Osgood, Suci, and Tannenbaum, 1957, p. 24, or DiVesta, 1970, p. 8 for a description of this process.) However, given the similarity for all humans of the nature of the perceptual world and of the lexicons of the speakers of a particular language, the semantic space of the child will successively approximate that of the adult with age, until at the approximate age of eight when children's systems are practically identical to adults' (DiVesta, 1966.)

Finally, the fact that appropriate use of graphic scales generally appeared sooner than verbal scales is additional evidence for Osgood's (1971b) thesis that linguistic and perceptual signs share the same system. The work of others, such as von Raffler-Engle in Developmental Kinesics (e.g. 1975) also corroborates this view. If language were a system separate from other cognitive systems, as Chomsky (1965) maintains, then there would be no relationship between the onset of ability to use words and pictures as modes of qualification. If qualification were a purely linguistic ability, then one would expect young children to use familiar adjectives appropriately long before any meaning at all was associated with the novel pictures presented in this experiment. However, exactly the opposite was observed. The pattern of usage among the pictographs approximated that which the adjectives would display later. Thus, many of the pictures had semantic meaning for the child and could be used to qualify nouns without prior training with them. Any meaning of these pictographs must have been acquired through perceptual experience with non-linguistic examples (e.g., a smiling vs. a frowning face.) And, these non-linguistic entities were generally used as semantic qualifiers appropriately sooner than the most familiar adjectives in the child's lexicon with which he had had extensive linguistic experience. This is perhaps the most globally significant aspect of this study.

Footnotes

[1]This research was supported by a National Science Foundation grant to C. E. Osgood and W. H. May. I am indebted to Professor Osgood for advice in all phases of this research and to Professor May for extensive aid in analysis.

[2]Stringent length restrictions prohibit inclusion of the materials used as well as many tables. These will be gladly supplied by the author on request.

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